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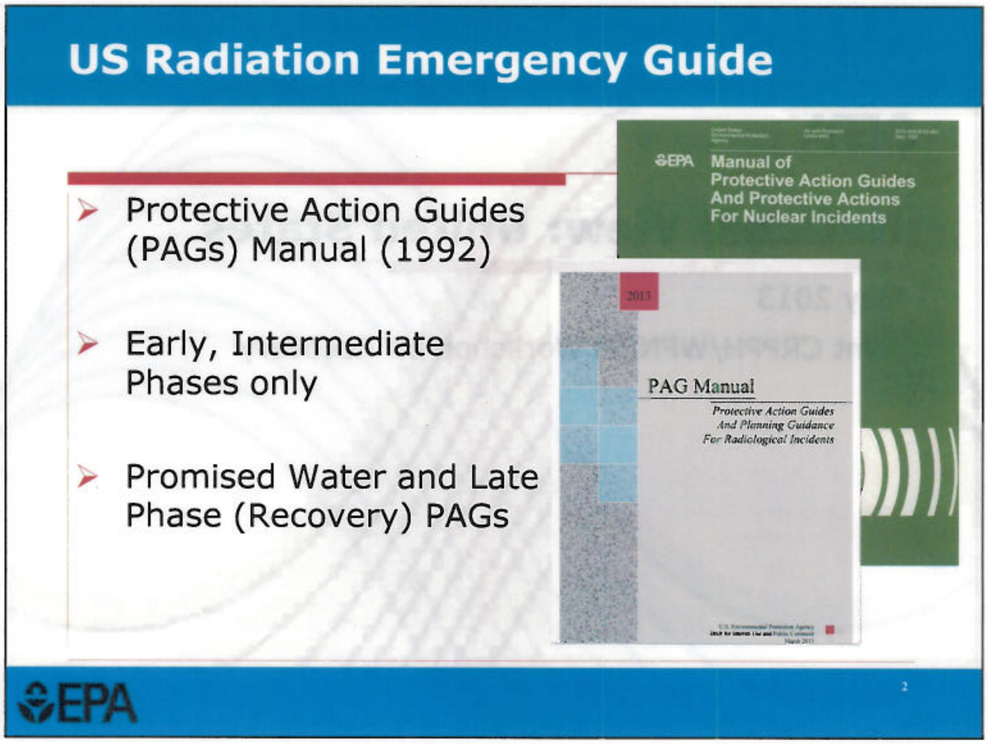
National View: United States

May 2013

Joint CRPPH/WPNEM Workshop on Recovery



In the US, the Environmental Protection Agency organizes a multi-agency federal group of experts to produce the Protective Action Guides (PAGs) Manual. The last version of the PAG Manual was issued in 1992. Like earlier versions, the guidance was very nuclear-power-plant–centric. At the time the guidance was written, the emergency response community believed that if PAGs worked for nuclear power plant emergencies, then they would be effective for all nuclear incidents.

The 1992 version of the manual still left out important guidance on drinking water and the late phases of an incident. The agency promised these in subsequent revisions of the manual.

We've just issued a revision of this Manual for pubic review and comment!

Preparing for Recovery

- Pre-2003: EPA-led efforts to write Late Phase (Recovery) chapter for PAGs Manual
- 2006, 2008: Dept. of Homeland Security issued Recovery guides for terrorist scenarios
- 2010: Senior US leadership identifies need for nuclear plant scenario re-entry, cleanup & waste guidance
- 2013: PAG Manual proposal pulls all these items together in one place

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Like other countries, we've been hard at work to prepare for long-term recovery from a radiological disaster, but it has been slow going. Interestingly, a very high-level drill was held in 2010 where leadership from most federal agencies discussed response and recovery after a hypothetical large nuclear power plant release. That was prior to Fukushima, and the work we did after that discussion led to longer-term guidance writing that coincided with the events in Japan.

Efforts highlighted here moved us toward the 2013 PAG Manual proposal, which pulls a couple long-term guidelines together in a single piece of national policy. Note that the timing of issuing this PAG Manual revision is not related to post-Fukushima lessons we identified, but we were able to include some notable improvements in the Manual because of best practices our international colleagues showed us.

2013 Draft PAG Manual

- Clarifies the use of PAGs for all radiological incidents including terrorism
- Lowers projected thyroid dose for potassium iodide (KI)
- Requests input on drinking water guidance
- Refers to 1998 food guidance
- Includes guidance for long-term site restoration
- Updates dosimetry from ICRP 26 to ICRP 60, by referring to FRMAC methods

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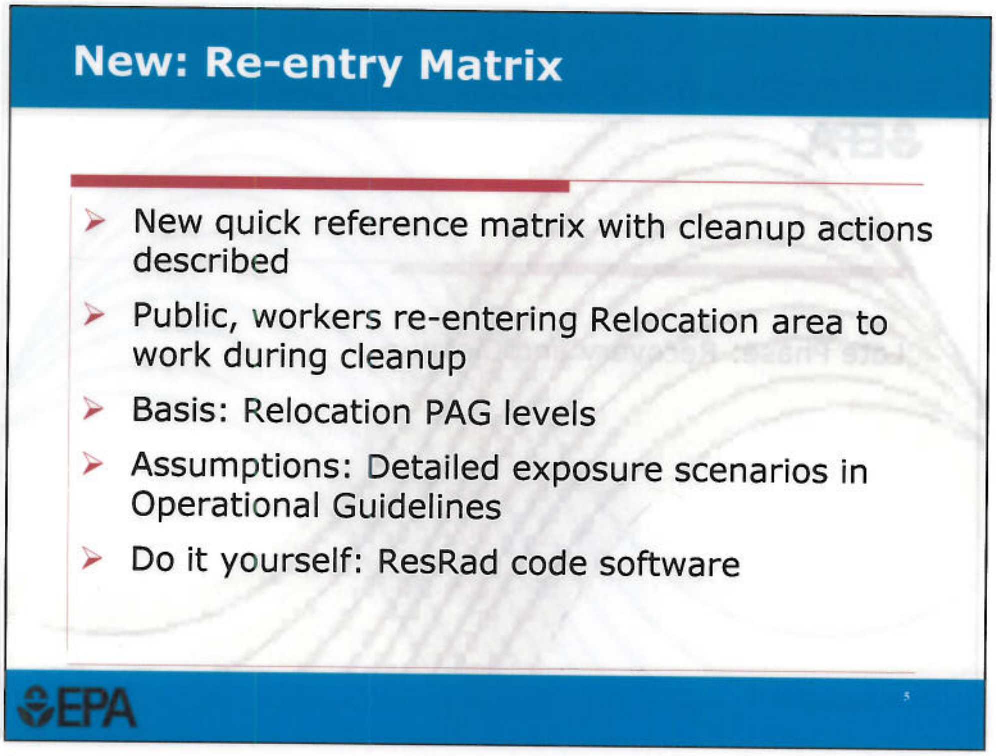
This is a brief overview of the changes that EPA has made to the draft PAG Manual. This Manual is out for public review and comment right now, and we hope to finalize it within 12 months.

The draft manual includes some drinking water guidance based on our regulations, as well as long-term site restoration guidance - which is the focus of these next slides.

Finally, the guide updates the dosimetry from International Commission on Radiological Protection Publication 26 (ICRP 26) used in the 1992 edition to the more recent ICRP 60.



The term reentry refers to emergency workers and members of the public going into radiologically contaminated areas temporarily under controlled conditions to retrieve items, support cleanup and decontamination efforts, and to restore infrastructure and businesses in the impacted area.

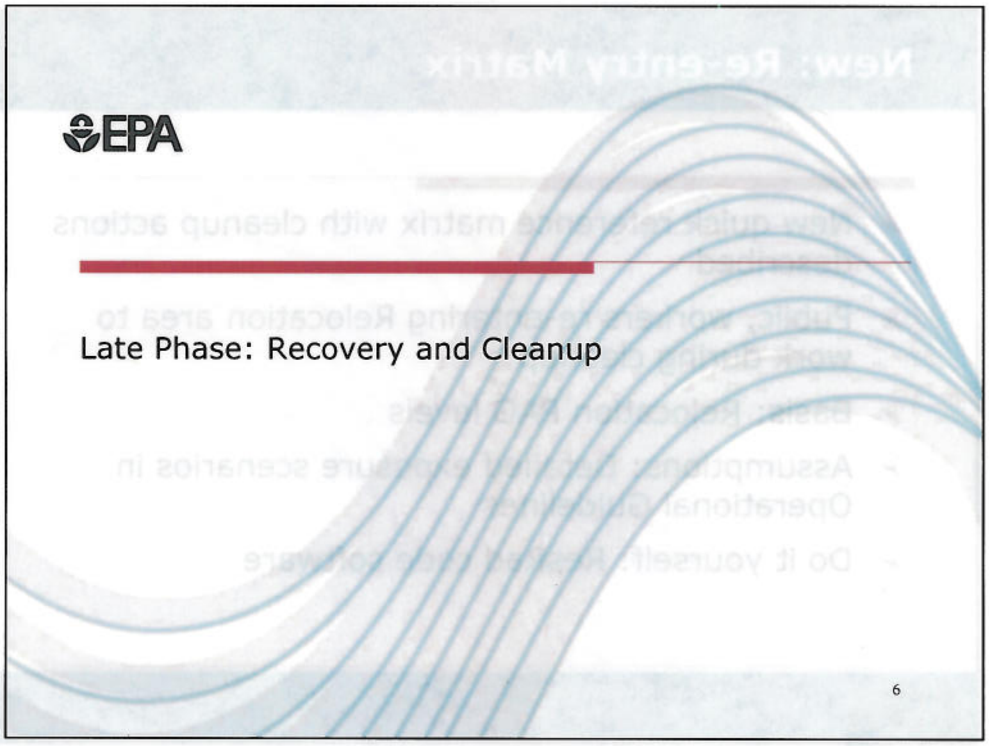
Interagency guidance informed this matrix, including— the 'Operational Guidelines'

"Preliminary Report on Operational Guidelines Developed for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident" (DOE 2009) and FRMAC Assessment Manual.

The Operational Guidelines include detailed numeric guidance, developed by a multi-agency working group as a follow-up to the RDD/IND Planning Guidance. That work focused specifically on response and recovery for an RDD event; however, that work will be expanded to include isotopes from a variety of incident types.

The Operational Guidelines are informative for this guidance, specifically the discussions about applicable dose-based limits, timeframes and pathways of exposure related to reentry tasks. Food and agriculture guides use FRMAC assessment methods as well as the Operational Guidelines for implementation. These tools allow derivation of decontamination thresholds for the early and intermediate stages of a response.

Also, as part of the U.S. response to the Japanese Fukushima accident, Argonne scientists performed dose calculations to ensure that passengers and workers on train trips through contaminated areas do not exceed doses typically received from cosmic radiation during an international flight. DOE's Argonne National Laboratory scientists utilized the RESRAD-RDD tool and hand calculations to approximate the NPP radionuclides.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Late Phase: Recovery and Cleanup
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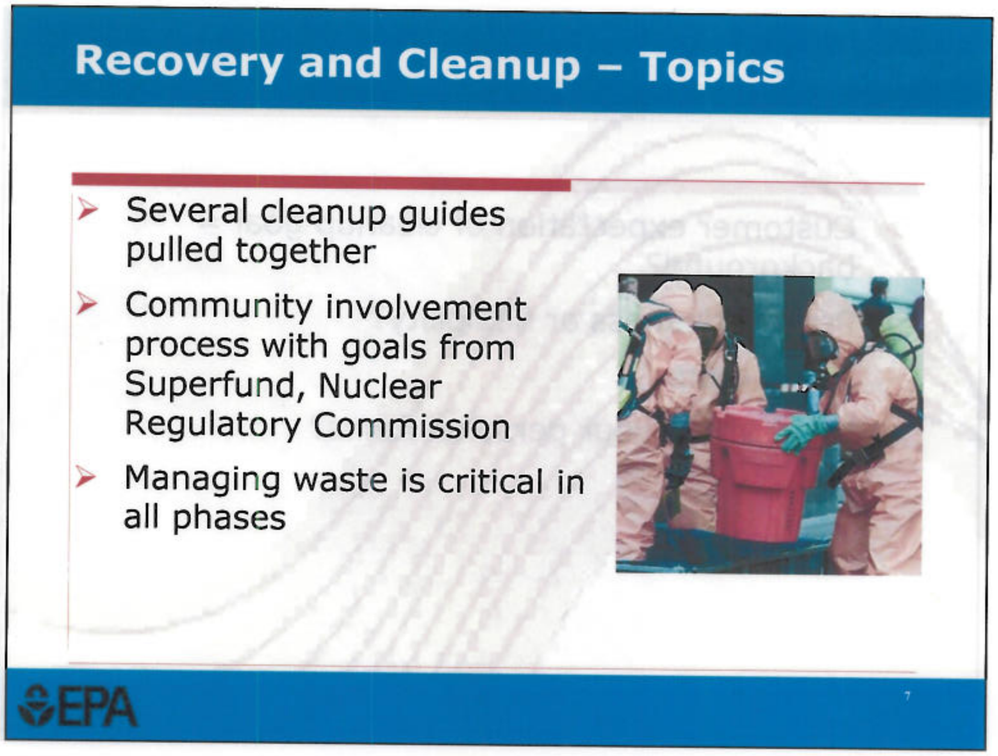
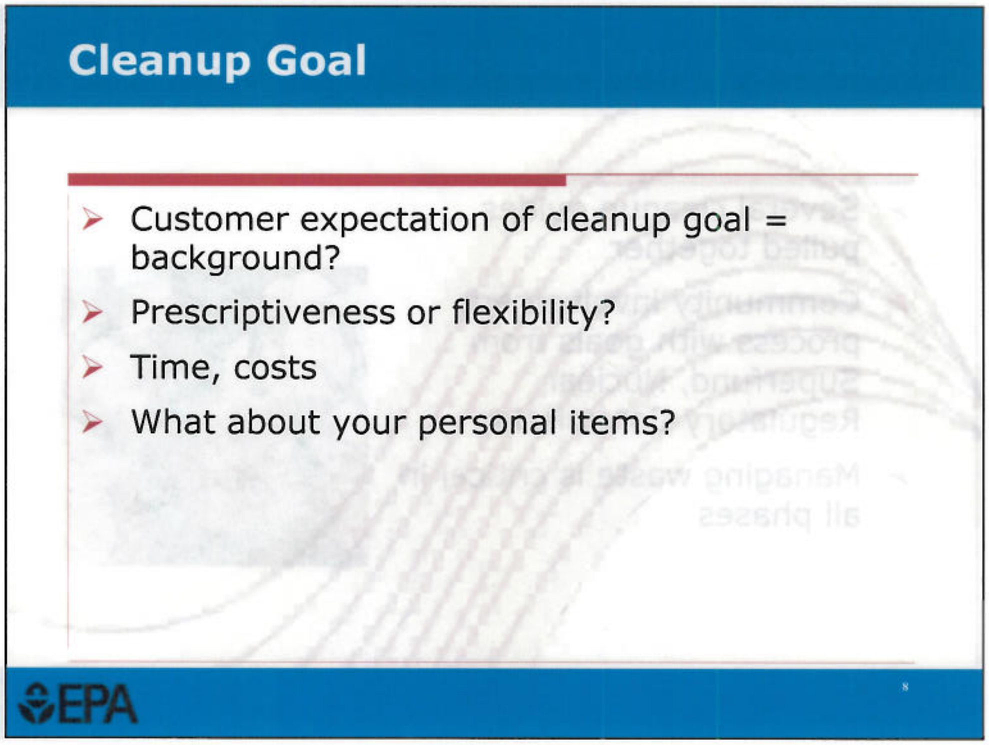


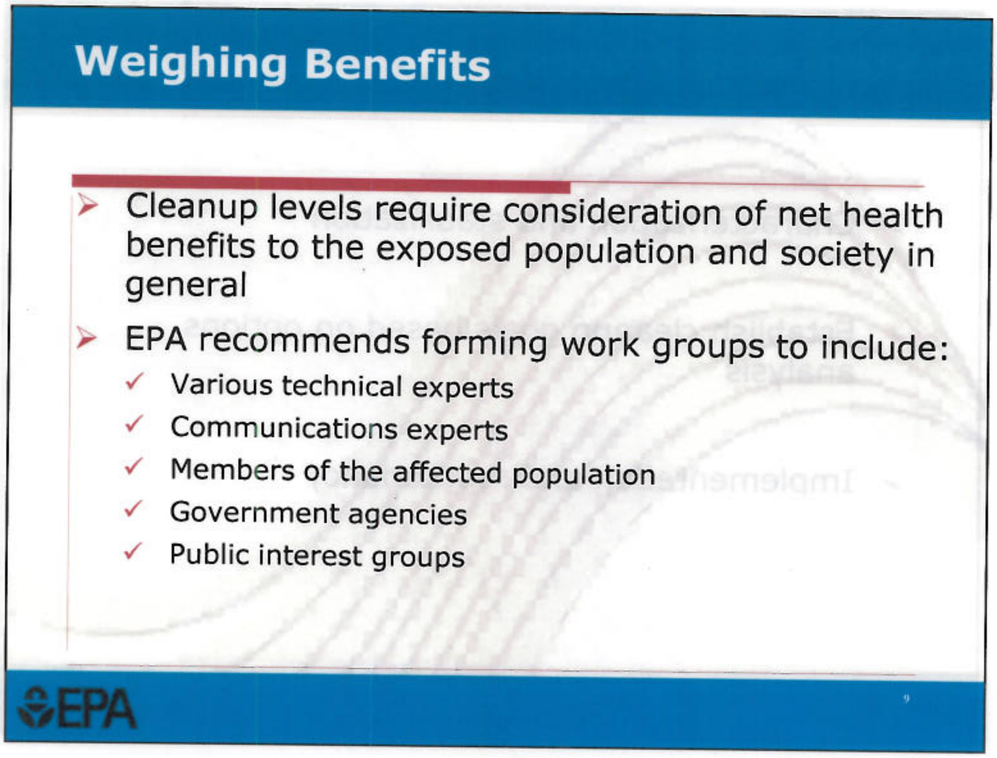
This compiled cleanup guide helps provide a bridge between emergency response, where higher dose may be tolerated, toward the long-term goal of striving for our fairly stringent environmental regulatory levels, over a long time, potentially.

Lastly, we'll go through some of the key parts of the Waste Management section, even though in truth, waste management starts in the early phase and only gets more critical to progress as the response matures. If you can't put the waste somewhere, at least temporarily, the cleanup work will get backed up.



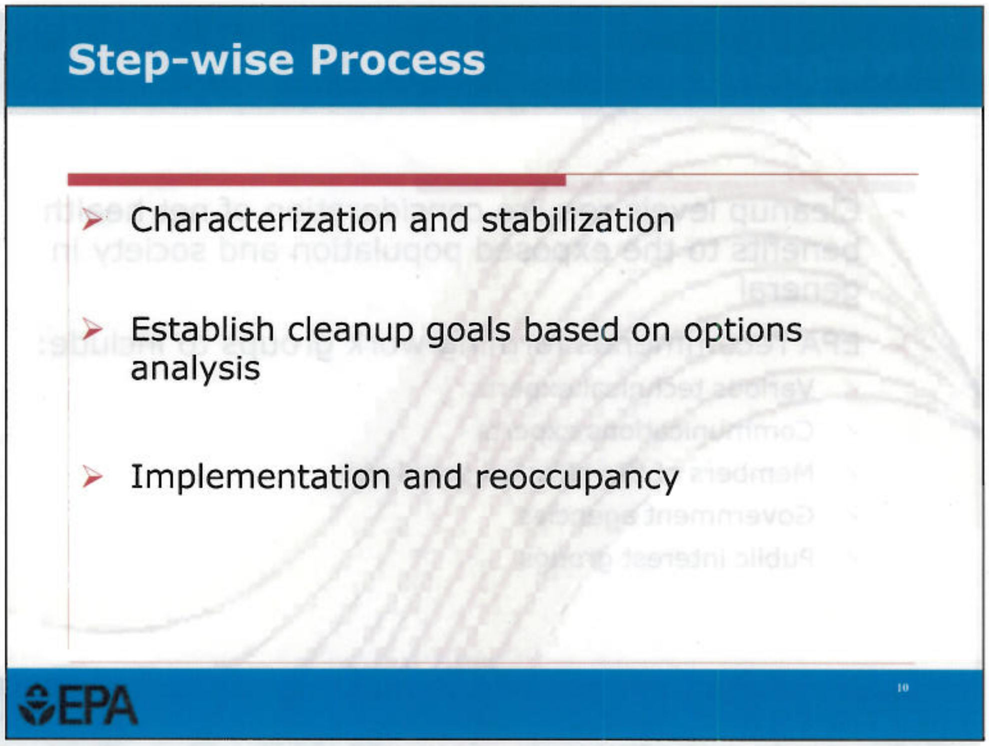
Ideally, the goal of the Late Phase is to restore the area affected by the radiological incident to as close to pre-incident conditions as possible. The ideal cleanup level is where doses and risk from radiation exposure have been reduced as much as is possible given the circumstances, costs, and benefits, which may include financial and social considerations.

You may be shocked to hear that environmental and anti-nuclear activists are very fearful that providing any flexibility for long term recovery will undermine our environmental regulatory protections. Even our state and local government partners express concern about the lack of a prescribed single cleanup number. However, no one cleanup number is perfect for all communities or spaces or scenarios.

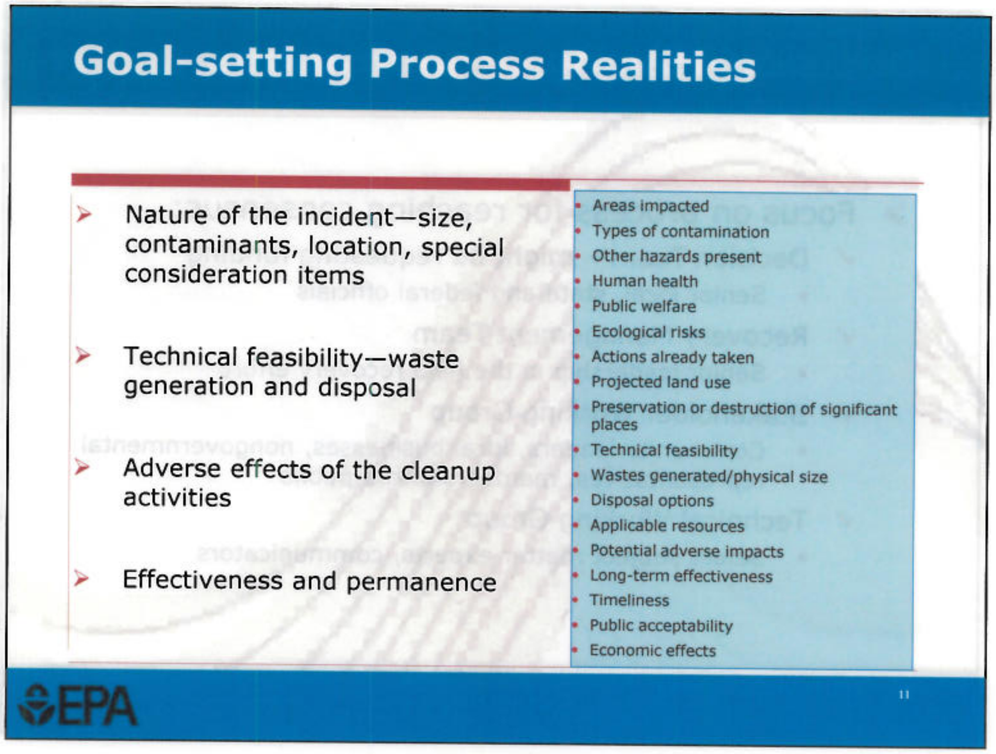


We envision a community involvement process used to determine local people's objectives for expected land uses, to develop and evaluate options and approaches, and to select the most acceptable recovery criteria. We recall the concept of optimization. However, the word may be going out of style, since it has been misunderstood to result in the optimal, or best, cleanup outcome.

EPA recommends forming work groups to focus exclusively on recovery and site restoration issues.

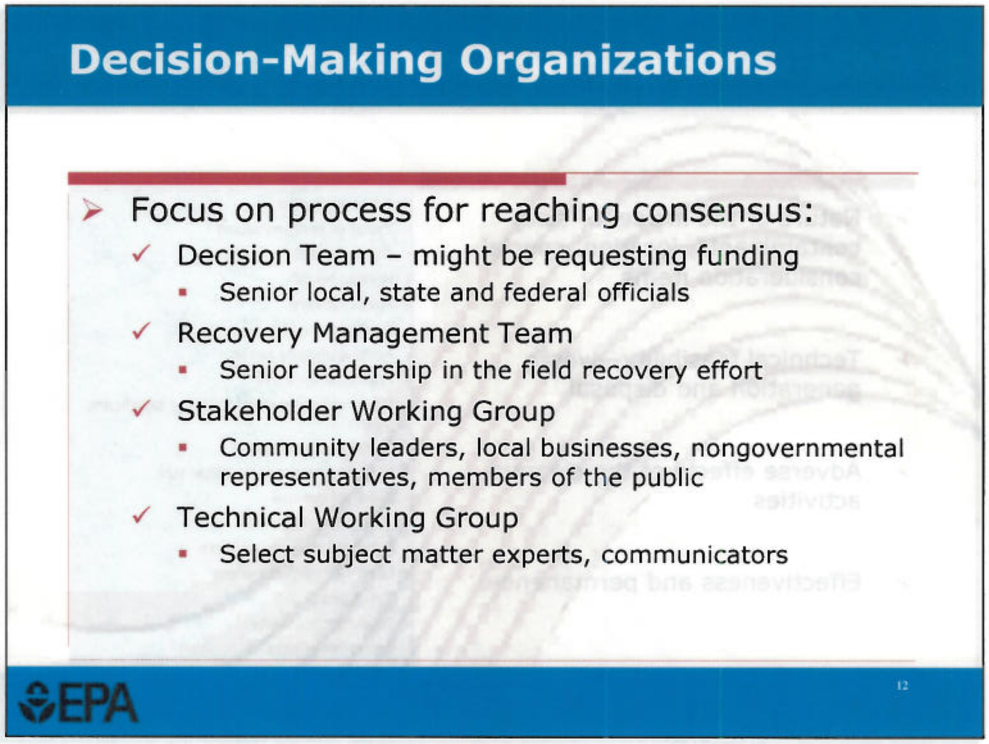


This is a broadly defined concept that is common to many state, federal, and international risk management programs addressing radionuclides and hazardous chemicals. It is a flexible approach in which a variety of dose or risk benchmarks may be identified from various regulatory agencies, state governments, or other stakeholders. Federal benchmarks include those used by EPA, DOE, DOD, and NRC in accordance with a number of different statutes and their implementing regulations. Other sources include the National Council on Radiation Protection and Measurements, the International Commission on Radiological Protection, and the International Atomic Energy Agency.



The cleanup goals analysis must consider a number of factors. Among these are the nature of the incident, including such special considerations as historical, religious, and nationally significant items, the technical feasibility of each option, any adverse effects that might arise as a result of cleanup activities, and the effectiveness and permanence over the long term. The box on the right side of the slide lists several considerations.

The evaluation of options for the Late Phase after a radiological incident should take into account many of these factors—such as ecological risks, technical feasibility, and public acceptability. However, in addition to the radiological component, a terrorist event may also require the consideration of biological and chemical contamination.



Consensus may be difficult to achieve, but it is essential to the success of the cleanup project. A variety of working groups may be formed at various points in the process to guide and oversee activities. Suggested work groups include a decision team, a recovery management team to oversee the field cleanup activities, a stakeholder working group, and a technical working group comprising relevant subject matter experts. Ultimately, the nature of the incident will dictate the number and type of work groups formed. However, in every case, it is critical that members of the affected population and other stakeholders be involved in the process.

The TWG and the SWG may work toward recommendations and the Decision Team may be discussing funding options with leaders. Long-term cleanup work might occur under several possible legal authorities, some of which have associated funding, and others that don't.

Work Group Expertise Areas

- Health physics and radiation protection
- Environmental fate and transport sciences
- Decontamination technologies
- Radiation measurements
- Site-specific demographics, land uses, and local public works
- Local community needs, wants, and wishes
- Legal authorities
- Waste management

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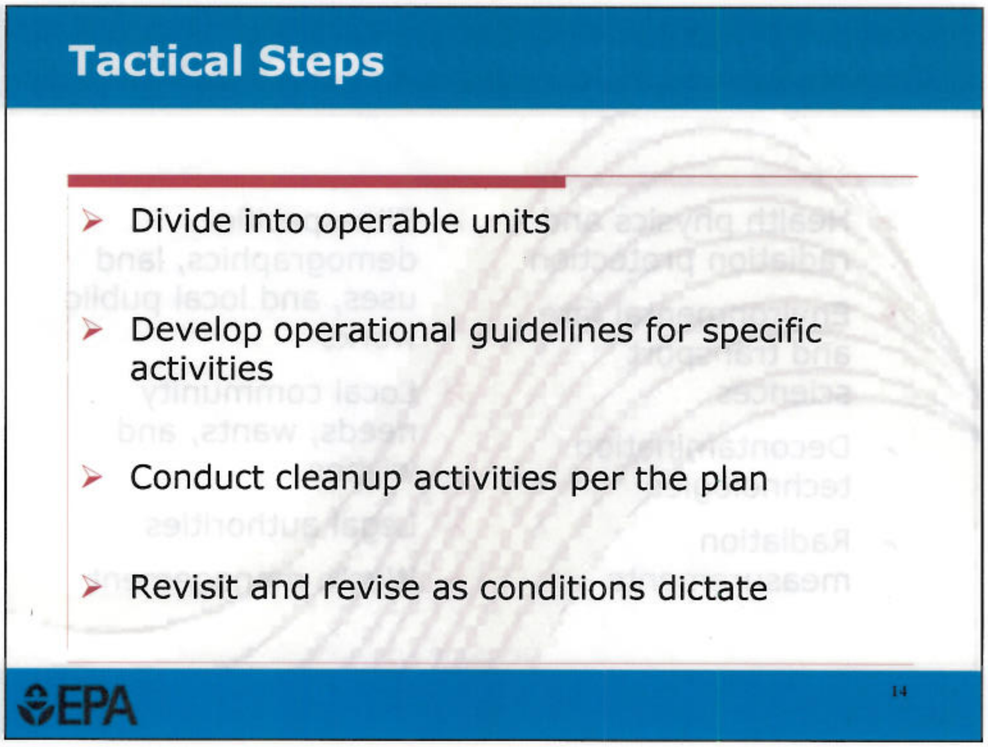
Each of the teams we just talked about will need consultation with these type of experts.

Depending on the type of radiological incident, certain areas of expertise may be required. This list represents the most likely areas, including health physicists, decontamination experts, public works experts, and members of federal, state, and local governments.

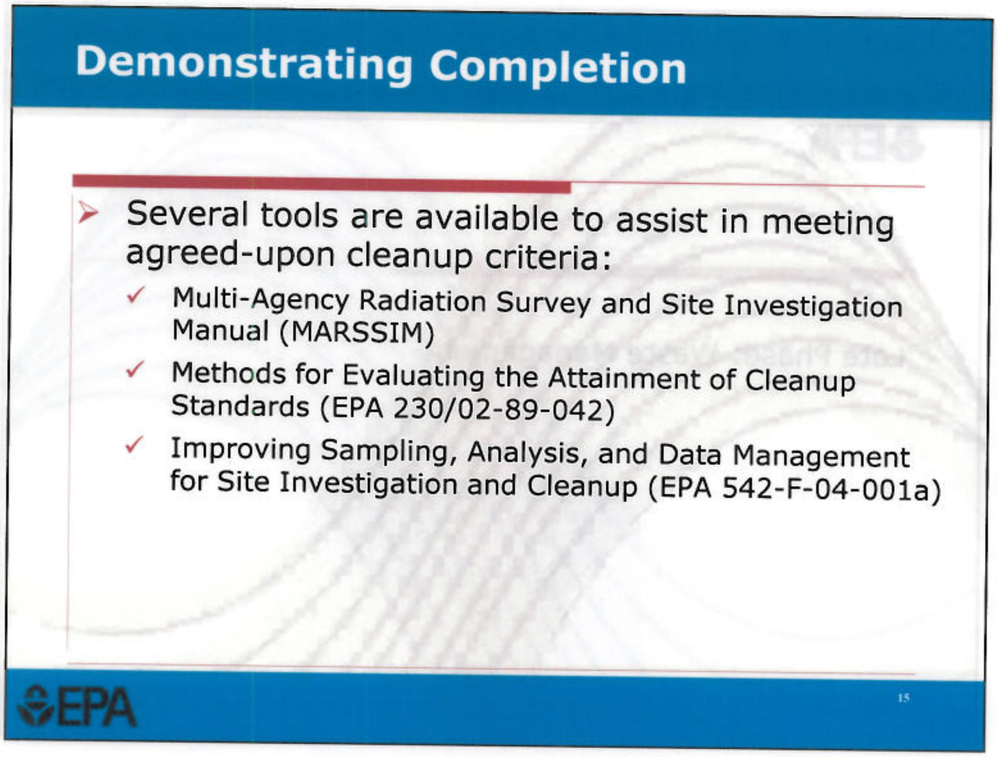


Operable units are handy for surveys and for cleanup prioritization.

Once the cleanup criteria have been agreed to, operational guidelines will be established. These guidelines are derived values that can be measured with field or laboratory equipment, and they directly relate to the cleanup criteria.

In developing recovery criteria, the various work groups will consider the exposure pathways, the affected populations, and the anticipated use of a contaminated facility or parcel of land.

Cleanup activities should follow a plan but may have to be reconsidered or revised depending on site conditions.



Several tools are available to help determine compliance with the selected cleanup criteria. These include the Multi-Agency Radiation Survey and Site Investigation Manual and other EPA guidance documents such as those listed here that deal with sampling and analysis.

You can use MARSSIM as a guide, and often users pick and choose what works for their site.

Late Phase: Waste Management

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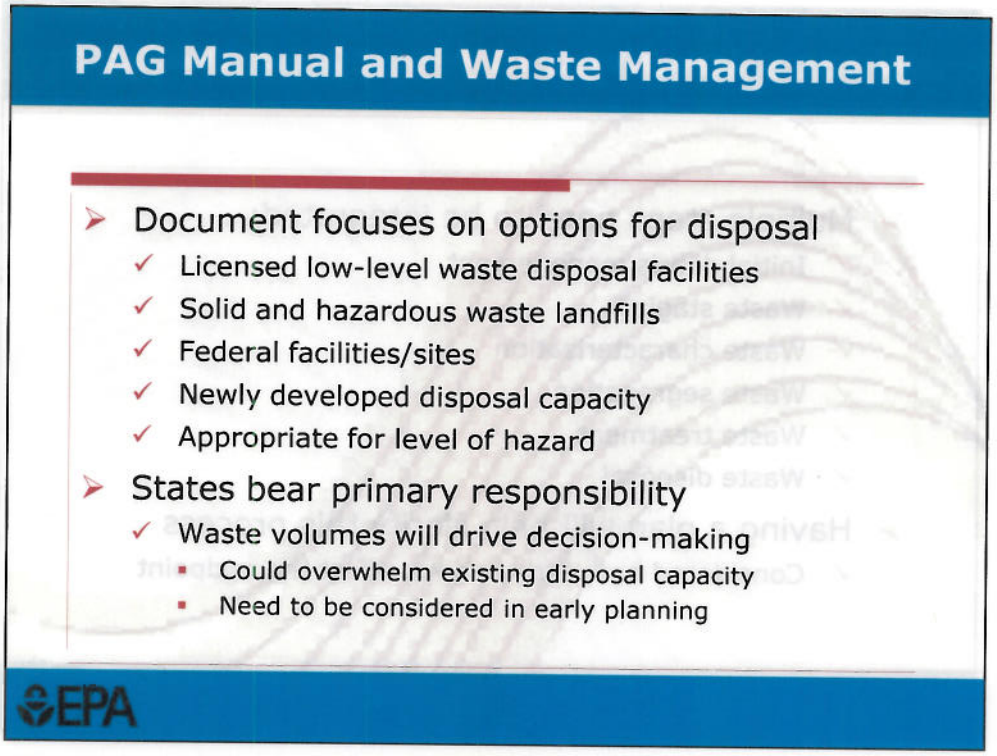

As part of the treatment of the late phase and recovery, the draft PAG Manual now includes planning guidance for waste management. Waste disposal, in particular, could involve decisions that will be difficult and need to be transparent and well-understood.

The Manual identifies the basic options that could be available for disposal and touches on the advantages and disadvantages of each, emphasizing the importance of selecting an option that can provide the necessary protection for public health and the environment. Much of the waste will be only slightly contaminated, if at all.

Waste disposal will be primarily a state and local responsibility. The Federal government will be available to support the decision-making process and help analyze the options. This is particularly true for local disposal decisions. While it would be nice to be able to send all the waste to a low-level waste disposal facility, the volumes from a significant incident may make this problematic. In Japan, the government is expecting to manage more than 1 billion cubic feet of contaminated soil, with some estimates ranging as high as 3 billion cubic feet. This is more than an order of magnitude higher than the current radioactive waste disposal capacity in the U.S., including DOE sites. It would be better to think about this situation before decisions need to be made.

What's Involved in Managing Waste?

- Multiple steps need to be integrated:
  - ✓ Initial debris management
  - ✓ Waste staging
  - ✓ Waste characterization
  - ✓ Waste segregation
  - ✓ Waste treatment
  - ✓ Waste disposal
- Having a plan will help clarify this process
  - ✓ Considered how early actions affect the endpoint

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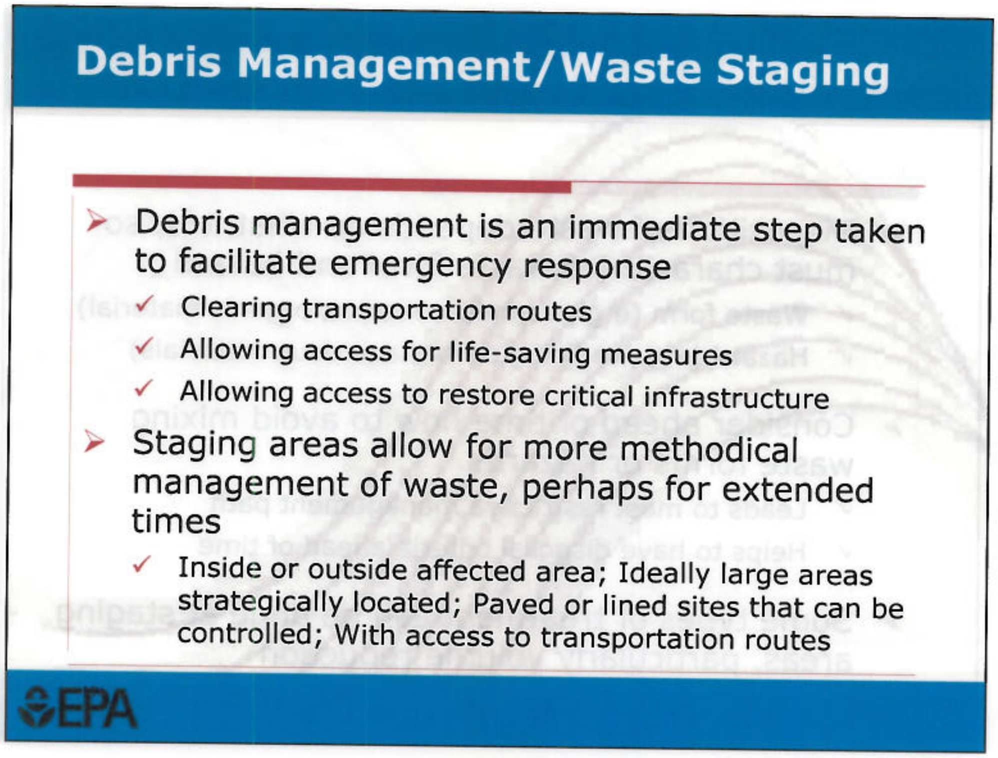
Although waste management is addressed as part of the late phase, it is important to recognize that waste will be generated from the very beginning of the response. EPA strongly encourages states to begin developing plans that address aspects of waste management. We have found that the responses to natural or other disasters, such as Hurricane Katrina and the BP oil spill, were to some extent hampered by the lack of planning for managing the resulting waste. People were unprepared to make decisions about waste disposal and to communicate with the public. The waste management team at Liberty RadEx was tasked to develop a plan to facilitate decision making.

Each of these steps should be explicitly considered because what you do initially will affect what you can do ultimately. For example, the decontamination and cleanup strategy will affect not only how much waste you generate, but also the waste types and characteristics. The next few slides will address each of these steps and planning considerations.



An important early decision is where to put waste as it's being generated. This is part of the overall waste management strategy and will help to limit number of times the waste has to be moved and avoid cross-contamination (some characterization needs to be done in the field).

Staging here is distinguished from storage as a more active phase. If there is a need for storage, you would look for many of the same attributes in a site. A staging site needs to be accessible but not heavily trafficked, and needs to provide sufficient space for managing large volumes. A large incident may have a number of staging/storage sites. The Japanese government is looking for "temporary" storage sites for 3 years and "long-term" storage sites for 30 years while it decides on disposal sites.

Examples of staging sites could include rail yards, industrial parks, military installations, or warehouses/hangars.

We found that the Citizens Advisory Panel at Liberty RadEx was effective in considering staging sites. Three sites had been identified ahead of time, but the CAP members actually identified several others that they believed would be suitable.

Characterize/Segregate/Treat

- Disposition of waste depends on what it is, so must characterize waste form and hazard
  - ✓ Waste form (e.g., asphalt/concrete, organic material)
  - ✓ Hazard (e.g., radiological or hazardous materials)
- Consider ahead of time how to avoid mixing waste forms or hazards
  - ✓ Leads to most restrictive management path
  - ✓ Helps to have disposal criteria ahead of time
- Some types of treatment can be done at staging areas, particularly volume reduction

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Characterization can be done in both field and staging areas. Field surveys can be done using meters or wipe samples. More extensive characterization would rely on lab sampling. However, lab capacity for waste sampling may be limited considering the likely emphasis on sampling soil, air, and water for public safety.

Smaller cleanups may effectively treat everything as radioactive waste for efficiency. RDD waste volumes make this a problematic approach. This is where it helps to have a preliminary waste management plan that considers how to utilize local or non-radioactive disposal options, so that some waste acceptance criteria can be developed.

Treatment vendors may be able to provide other services, including packaging

Disposal of Waste

- Waste will range from radiologically uncontaminated to highly contaminated
  - ✓ Waste characterization will need to be thorough
- State and local officials have to consider
  - ✓ Local disposal – under what conditions? How much?
    - What are the restrictions in your state?
    - How does disposal integrate into recovery plans?
    - How will you involve the local community in decisions?
  - ✓ Constructing new disposal capacity
    - Where? How quickly can this be done?
  - ✓ Other states may object to accepting the entire burden

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Local disposal will be one of the most sensitive topics for state and local officials, as we know from experience in this country and have seen more recently in Japan. It would certainly be desirable to send all the waste to a designated facility, but this may not be feasible. These decisions need to be made in a transparent and defensible way, showing the basis for a determination that public health and the environment will be protected. Communities may feel burdened by the disposal of waste from a significant incident, even if it is not significantly different from the waste already going to a given facility. We have seen this in Katrina and BP. Construction of a new disposal facility can also be expected to generate some opposition, Nor is it likely that other states will take on the burden without some "shared sacrifice." These are additional reasons for states to begin thinking about how they will manage these responsibilities, and how they will respond if neighboring states need assistance.

EPA Waste Management Resources

- Waste Estimation Support Tool (WEST)
  - ✓ First-order estimates of waste types and volumes
  - ✓ Based on analysis of plume maps
- Chem-Bio-Rad Disposal Technology Workshop
  - ✓ Technical issues in developing new capacity
  - ✓ http://www.epa.gov/nhsrc/pubs.html
- Minimization/Segregation Technology Guideline
  - ✓ (available soon)
- Interactive, web-based Waste management planning tool for incidents (early concept)

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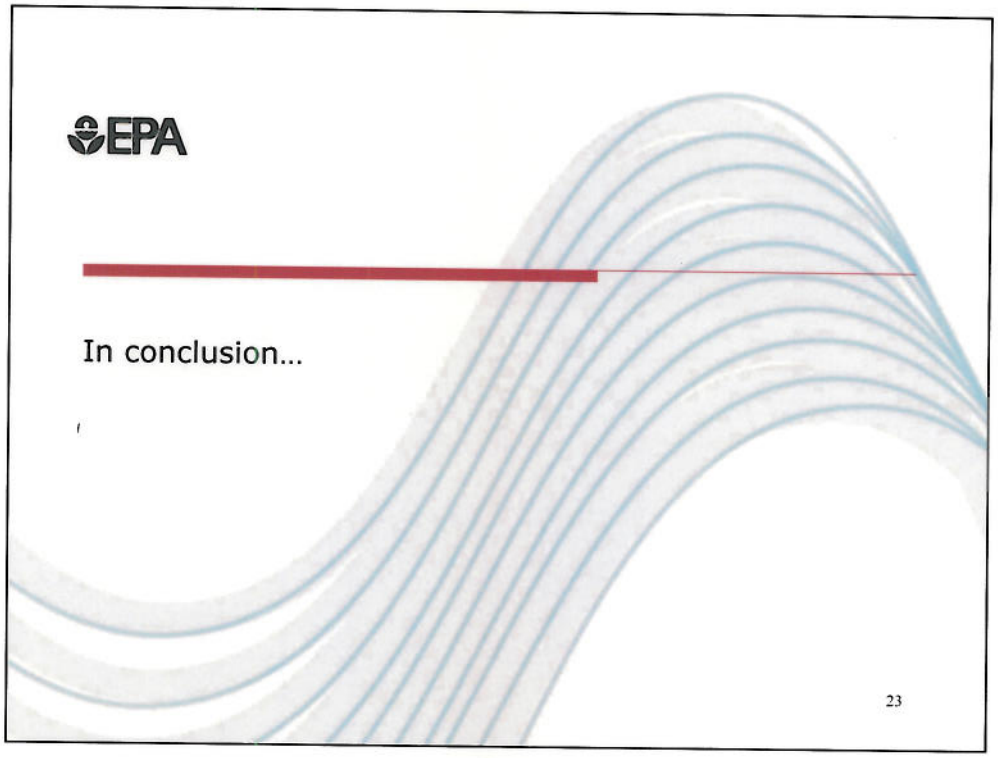
This slide describes several products developed by EPA that states may find useful in waste management planning.

The WEST combines NARAC plume maps, GIS, satellite imagery, and a FEMA database of building stock to estimate waste generation in different contamination zones. Estimates would be refined as data comes in. Volumes are highly assumption dependent, e.g., on cleanup levels and decontamination strategies/methods. Users can select from several different decontamination technologies or specify their own. The sensitivity of waste generation, such as water demand, can be assessed by varying the assumptions. WEST was the original topic for this session and is intended to be available to state and local planners.

The Waste Minimization and Segregation Operating Guidelines evaluates a number of technologies that can be used in the field, based on attributes such as ease of implementation, worker impacts, and cost.

Most recently, EPA has begun to develop a concept for a waste management planning tool. Last month a workshop was held with states in Region 3, and another is planned for state in Region 5 (I think In June). [If anyone asks, you can give them Cayce Parrish's contact information]



While the US has a breadth of hazardous materials and natural disaster recovery experiences, a large radiological incident has not yet forced us to deal urgently with wide-area radiological contamination before. We are providing some assistance to our Japanese colleagues and admire the care and thought that clearly shaped the national recovery strategy there. We are glad to collaborate with everyone on sharing preparedness concepts for successful long-term recovery.